42

ROCKS and MINERALS

A Magazine for Mineralogist, Geologist and Collector . . .

. . . . . *Official Journal of The Rocks and Minerals Association*

. . DECEMBER, 1937 . .

Vol. 12 No. 12 TWENTY-FIVE CENTS Whole No. 77

Christmas

EXHIBITION SALE

ON DECEMBER 23, 24, 26, 27 and 28th

I shall hold an exhibition-sale of fine mineral specimens

at

1 East 44th St., New York City, 30th floor

Material exhibited will include: the most beautiful *Variscites* ever seen.

Magnificent crystallized specimens of the rare Fairfield, Utah, *Phosphates*. Unique *Amethysts* and *Tourmalinated Quartz* from a new Montana find.

Other material collected by Edwin Over and me during four years of collecting.

And a superb list of minerals purchased by me in Europe last spring.

All interested are cordially invited to attend.

ARTHUR MONTGOMERY

1 EAST 44th STREET **NEW YORK CITY**

ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

DECEMBER 1937

CONTENTS FOR DECEMBER, 1937

Entered as second-class matter September 13, 1926, at the Post Office at Peekskill, N. Y., under the Act of March 3, 1879.

Specially written articles (as contributions) are desired.

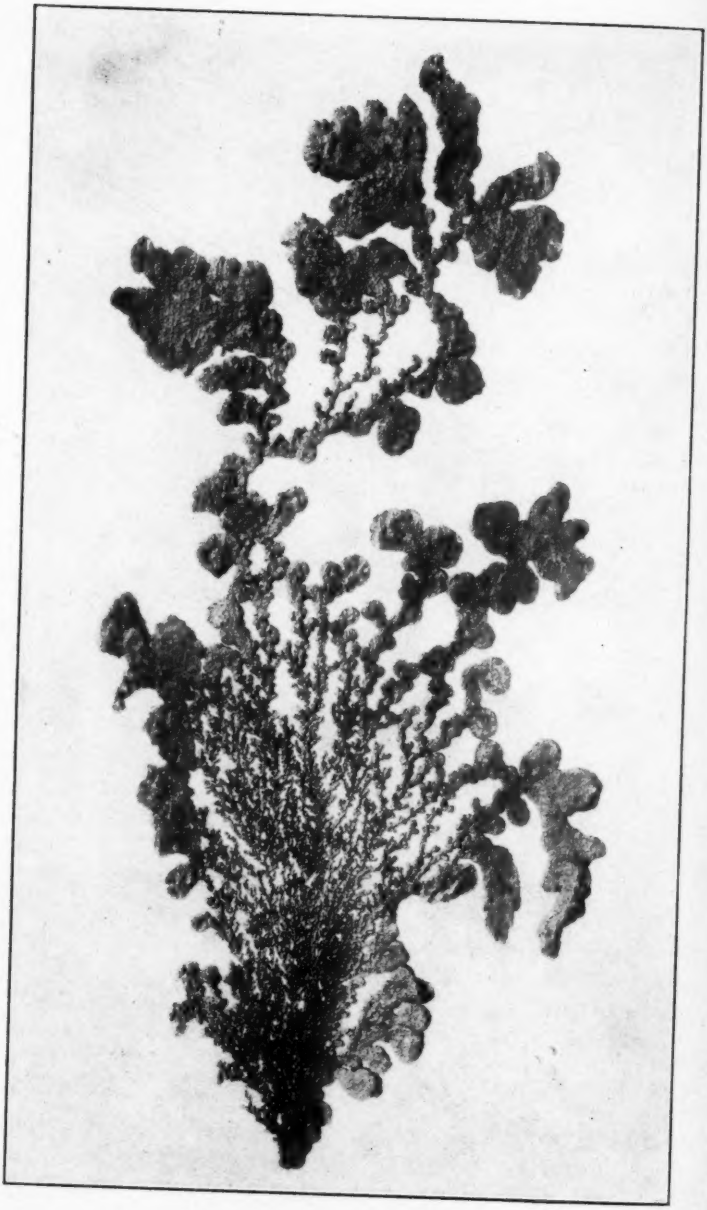
Subscription price $2.00 a year; Current numbers, 25c a copy. No responsibility is assumed for subscriptions paid to agents and it is best to remit direct to the Publisher.

Issued on the 1st day of each month.

Authors alone are responsible for statements made and opinions expressed in their respective articles.

ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association



Courtesy U. S. National Museum

NATIVE COPPER (Arborescent)
Corocoro, Bolivia

NATIVE COPPER

Native copper is a mineral which has a number of unique features. It is an element, a metal, an ore, can be cut and polished for gems, and often occurs in such fine specimens that its acquisition for collections is in keen demand.

The color of native copper is the same as that of the artificial product, copper —a peculiar shade of red which has been designated as copper-red. But native copper is often so tarnished that its exterior surface presents shades of black, blue, brown, often so dark that its resemblance to copper-red is obliterated. The weight of such a mass, however, especially if it is pure native copper, plus the shiny, metallic streak (when scratched) easily identifies it.

Native copper is heavy, sp. g. 8.8, its hardness is 2.5 - 3, and it is highly ductile and malleable. It crystallizes in the isometric system whose chief form is a cube, but often in octahedrons; the crystals being generally small. The mineral often assumes imitative forms as arborescent, dendritic, filiform, platy, reticulated, tufts and even occurs massive and as sand.

The mineral is found in all types of rocks, chiefly in igneous, in metamorphic rocks (slates for example), and in sedimentary rocks of which sandstone may be the most prevalent. Native copper may occur in veins or beds associated with many copper ores as azurite, chalcocite, chalcopyrite, cuprite, and malachite.

The copper mines of northern Michigan are the world's greatest deposits of native copper—in fact in the huge mines of the area (some over a mile deep), the chief ore is native copper. The copper bearing area is estimated to be 200 miles in length.

Native silver is a common associate of native copper in the Michigan mines. Very often the two minerals occur together in masses of which one-half will be silver and the other half copper. These are known as "half-breeds." Beautiful specimens of crystallized native copper occur in the Michigan mines. Sometimes tips of the native copper will be surmounted by native silver and vice-versa. But perhaps the most desirable specimens, for which the region is famous, are the marvelously beautiful crystals of limpid calcite with their enclosures of bright red copper. These are often found in cavities, resembling miniature caves. Strings of native copper are often embedded in analcite, epidote, prehnite and other minerals of the region; another common occurrence is in amygdules of basalt and as platy masses and strings in conglomerates in which the copper is the cementing material for the pebbles.

Michigan is not the only locality noted for native copper as many areas throughout the world furnish the mineral. Beautiful specimens are found in the copper mines of Arizona and Cornwall, England, often associated with various copper minerals of which cuprite may be the most important. In Corocoro, Bolivia, magnificent specimens of native copper have been found.

CHIPS FROM THE QUARRY
(EDITORIAL PAGE)

To Our Subscribers and Friends

A Merry Christmas and mav 1938 bring each and all of you Happiness, Prosperity, Contentment and a renewed Interest in the wonderful beauty, charm and diversity of the mineral kingdom in which we are all so interested.

Make This a Mineralogical Christmas

Remember your collector friends this Christmas with mineral specimens, gems, books on minerals, lapidary supplies or other mineralogical items. The pages of this issue of **Rocks and Minerals** contain many desirable items which are offered for sale by our many advertisers. This makes it easy for you to select gifts and your collector friends will appreciate mineralogical presents.

Subscriptions to **Rocks and Minerals** also make delightful gifts. Each month of the year your friends will receive copies of the magazine; thus your present running into 12 issues.

New Authors Attention!

To those of our readers who may be contemplating writing their first article on minerals, we wish to offer a few words of advise. Type your article if possible, double space it, and make a carbon copy of it which you retain for your personal use. Then send out but ONE copy to a magazine (**Rocks and Minerals** of course). Never send copies of the same article to two or more magazines.

What! No Jokes

We have received many favorable comments on our proposed joke column in **Rocks and Minerals** but so far very few jokes have been submitted. Wouldn't it be a joke if our joke column turned out to be a joke!

Radio! Radio! My Kingdom For a Radio

During the past few months we have listened to many programs on the radio and especially to those featuring hobbies. We have learned that thousands of miscellaneous items of every form and description are collected by our millions of citizens. Many of these items receive very prominent, often too prominent, attention on the radio. Not so with minerals; they are not even mentioned. Surely among our very large number of readers there must be at least ONE individual who has some influence with a broadcasting company. Will this individual put in a good word for our hobby?

Regarding Stephen Varni Co's Ads

In the November issue of **Rocks and Minerals,** all ads of the Stephen Varni Co. were unfortunately left out. In notifying us that we were soon to receive a complete series of new ads, which we thought were for the November issue, all of their old ads were taken out. The new series were for the current December issue.

We deeply regret this blunder on our part and our humble apology is extended the Stephen Varni Co.

ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

DECEMBER . . 1937 . .

VOL. 12 NO. 12

The Official Journal of the ROCKS and MINERALS ASSOCIATION

WHOLE NO. 77

COLLECTING IN GREENLAND

By CHARLES R. TOOTHAKER
Curator, The Commercial Museum, Philadelphia, Pa.

Leaving Philadelphia August 21, 1937 at midnight, we headed for Nova Scotia, sailed through the Gut of Canso, the Gulf of St. Lawrence, the Strait of Belle Isle and across Davis Strait, arriving off the mountainous coast of Greenland on the morning of September 2nd. The trip was a little slow because of fogs, head winds, waves, gales, icebergs and two hurricanes. Winding among rocky islands near the base of a snow-capped mountains called Kungnat, we entered Arksuk Fiord and rounding a corner saw the town of Ivigtut. It lies in a seemingly hemispherical valley bounded by mountains 1,600 to 2,000 feet in height, gray bare rocks with dull green vegetation and flowers on the lower slopes. The thermometer on shore varied from fifty to seventy degrees most of the time and an overcoat was unnecessary during the day.

The cryolite mine is a great open pit perhaps a hundred and fifty yards by a hundred yards and not quite two hundred feet deep with sides that are nearly vertical. (In some ways it would remind you of Strickland's Quarry in Connecticut.) Down at the bottom are two steam shovels to load the mine cars that go out through a tunnel and so reach the foot of a shaft. The top of the shaft which is the only entrance to the mine is a hundred feet or so from the edge of the pit. There are two tunnels at the bottom running out nearly four hundred feet and the great pit is so close to shore that they actually mine cryolite under the sea. The floor of the pit itself is far below sea level and the top of the mine so few feet above high water that a heavy concrete wall had to be constructed to keep the waters of the fiord from flooding the mine. There is a layer of granitic rock on one side of the mine above the cryolite but the deposit originally came to the surface. (I succeeded in getting a piece of this old surface cryolite showing glacial scratches plainly.)

Incidentally, they say that the Greenland natives, before the coming of white men, powdered the cryolite and used it as snuff. Considering the fact that the mineral is slightly soluble and the amount of fluorine in it, the practice seems to have nothing to recommend it.

The steep walls of the mine are gray in color and the miners, suspended in rows by lōng steel cables, work with American air drills. Blasts are shot several times daily sending hundreds of tons of cryolite down to the bottom.

A narrow gauge railway runs for half a mile close to shore and there are heaps of cryolite all along it, and thousands of tons more stored in a great gray building of sheet steel that looks a little like a grain elevator.

The mine cars bring the mineral from the shaft and are emptied. When a ship comes in port she is moored twenty feet off shore, a gang of men with shovels loads a train, a loading machine

picks up the cars one by one, carries them through the air and spills their contents into the ship's hold.

All along the half mile where the cryolite is piled there is a sea wall composed of rough stone in masses of two to four feet and, while some of it is granite rock, a very large percentage of this is cryolite.

Roads are cryolite, people who die are buried under cryolite in the little cemetery up on the hill. There is a lovely tennis court but in order to get a level space they used a few thousand tons of cryolite. Now when you are told that cryolite sells for $150.00 or so a ton, you may realize that the floor of that tennis court is worth not less than half a million dollars, making it the most expensive tennis court in the world.

Cryolite is used in the electrolytic bath in which aluminum is separated from its ore. Cryolite also enters into the composition of glazes and enamels such as are on your enameled cooking utensils, on your electric refrigerator, and on the surface of tiles. It goes into the mixture of materials for making beautiful milky glass and is a base for the manufacture of many chemical salts.

During the summer months the population of Ivigtut is about one hundred persons, some of whom go back to Denmark for the winter. I am told that pay is relatively high, laboring men receiving as much as $225.00 per month plus board and lodging. (There is no chance for a job; they employ only Danish citizens.) The management plans for the first time to work the mine all this coming winter.

Map showing Ivigtut in Southern Greenland

To a collector of mineral specimens a visit to Ivigtut is a wonderful experience. The deposit, of course, is absolutely unique, for cryolite and a number of related minerals (fluorides of sodium and aluminum) have been found nowhere else in the world (except for very small occurrences in Colorado and in the Ural Mountains). On shore I was free to go where I pleased, take what I chose, and as much as I wanted. In one place is a great heap of nearly pure white cryolite twenty feet high. Near it another pile which shows brown seams in which you hope (usually in vain) to find good cryolite crystals. Another pile attracts you and you visit it repeatedly and have a little luck. Then a row of piles with a lot of white mineral and brown dirt, not limonite, but hagemannite. Here there will be plenty of siderite, galena, chalcopyrite and pyrite. If there has been rain recently the cryolite is so clear that you can see white quartz standing out clearly in contrast. The two are almost indistinguishable when dry. Then, too, you can see the galena and other included minerals deep down in the wet cryolite.

Once in a while you see a bright purple fragment, rarely a fair-sized purple chunk, cryolite, too! You put it in your pocket and are bitterly disappointed when you take it out a couple of hours later to find it plain white. But wet it thoroughly again and the purple color returns. The manager of the mine has a theory that the color is in some way due to molecular strain caused by the shock of blasting. He says it is particularly noticeable after a blast and close to the hole. If that be true the effect is evidently fleeting in much of the mineral, for very few pieces of this purple cryolite are to be found and these are noticeable only when they are wet. Yet the color is not simply on the surface. A piece three inches in diameter, if broken, shows if anything

a stronger purple color inside than outside. The color may perhaps be due to inclusion of fluor.

Until recent years chiolite was found only rarely and then in small crystals, but lately it is coming out in fair quantity. Sometimes you pick up a good-sized chunk of pure chiolite, but often it is closely associated with cryolite. As a general rule chiolite is more transparent than cryolite, sometimes perfectly clear and glassy. When this material is penetrated by curtains of frost-like quartz it makes attractive specimens. Chiolite is often laminated and shows faint rainbow colors which help in identification. All in all, however, it is a rare mineral and I was fortunate in getting some wonderful specimens.

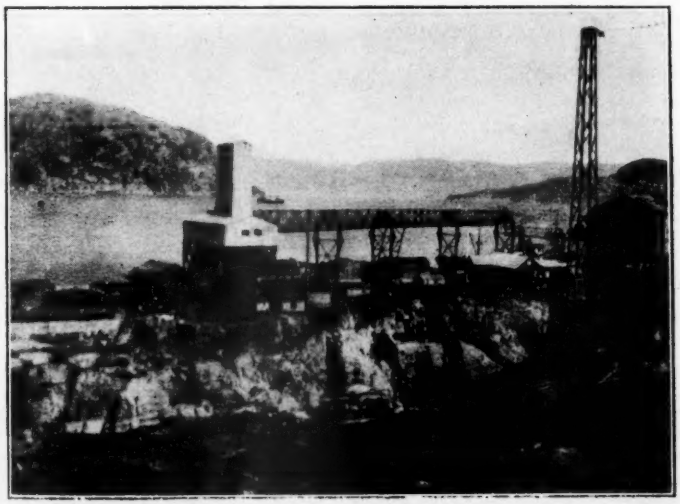
You can get plenty of good cleavages of siderite three inches on a side and occasionally up to twelve inches. By looking carefully and breaking the rock you have no trouble finding good groups of siderite crystals up to one and a half inches or more on a crystal edge.

Pachnolite is common but little of it is in good crystals. Even when crystallized it is generally brown and dirty. The usual combination of patience, hammer and chisel is sure to result in a fair crop of good, clean, bright specimens on a base of hagemannite. The best pachnolite I found had not been taken from the mine recently but was in the big rocks along the sea wall.

Thomsenolite is not common and resembles pachnolite so much that identification is not always easy. Some I found was in massive layers up to three-eighths of an inch in thickness on the surface of cryolite and covered with a thin brown coating of hagemannite.

Ralstonite is rather rare but I found a little.

Along with these alteration minerals and especially at one place on the shore, there was a fair amount of barite, somewhat altered, and showing a radiated structure. On this barite and in small cavities there are small crystals occasionally transparent and clean, but usually stained brown. These little crystals puzzled me. They are closely associated with altered cryolite, pachnolite and ivigtite. Here also one finds a fair amount of gearksutite.



Cryolite Mine, Ivigtut, Greenland

In one place on the sea wall were many great masses of cryolite containing plenty of ivigtite, most of it in thin irregular veins but occasionally in seams an inch or two in thickness and quite pure. The trouble with this greenish mica is that when wet the pure material breaks up very easily and it is not easy to get any but small specimens except in thin seams in cryolite.

White quartz is very common, sometimes massive, frequently in fairly good crystals. These are seen clearly in material which has been exposed for years, the cryolite having dissolved away, leaving the quartz and weathered crystals of siderite.

There is plenty of granular purple fluorite mixed with quartz and cryolite, but the miners regards this mineral as an objectionable impurity. Its appearance is quite different from that of the purple cryolite previously described.

The granitic country rock occasionally shows good crystals of feldspar, frequently fair-sized cleavages, near the contact with the cryolite deposit. Here you sometimes find crystals of cassiterite and of wolframite. Black hornblende and green epidote are much in evidence. There are some unusual micas also.

Now for a few confessions. I thought I knew these minerals pretty well but I smiled at myself often to see how I was fooled. This piece I know is cryolite, this I am certain is chiolite, but lots of times I confess to myself I do not know one from the other. Then I see a chunk of feldspar and gray quartz with some black spots an inch in diameter. I pick it up, thinking of columbite but generally this black stuff is cryolite. You can get large pieces of black cryolite as well as some pinkish and some yellowish. There is a piece of cryolite which is wet from recent rains and very translucent. There are black patches on the surface and black material inside. Now and then it is columbite but it is usually galena. It is surprising how often the galena fools you with its surface tarnished by exposure. And there is a piece of stuff with lots of pachnolite, tarnished and dirty. You hope for good clean crystals inside and once in a while your hopes are rewarded. There is so much good stuff for a collector in that half mile along the shore that you carry a load every time you return to the ship.

Then while you feel disconsolate in a hurricane going across Davis Strait, the captain worrying about icebergs, you wonder why you did not bring a few hundred pounds more with you. But down under the hatches there are three thousand tons of stuff to be unloaded in Philadelphia, a cargo worth a half a million dollars. There are lots of good specimens there but Oh, what we left behind!

Well, just one other thing. I saw glaciers and icebergs. Of course, water is a mineral but unfortunately we cannot put specimens of ice in our collections. But Oh, such colors! Marvelous blues and a green that shines and sparkles like the color of satin in the sunlight.

I add the following list of minerals of Ivigtut, Greenland.

The world's only important occurrence of cryolite is at Ivigtut, on the southwestern coast of Greenland, where it is found in a deposit in granitic rock and is associated with many minerals. The locality is on the Arksuk Fiord, twelve miles from the sea.

CRYOLITE is the chief mineral in the deposit. The pit is now open to a depth of nearly two hundred feet and it is believed that the deposit does not go much lower. The general manager estimates the life of the mine at fifty years more.

Cryolite is sometimes found in transparent crystals which resemble cubes (but are monoclinic), up to three-quarters of an inch on an edge, usually much smaller. The massive mineral is snow-white, sometimes yellowish, pinkish, black, rarely purple. It generally has included in it siderite crystals, quartz, galena, chalcopyrite, pyrite, and less commonly columbite and sphalerite.

Cryolite received its name "ice stone" in allusion to its resemblance to ice. It becomes quite translucent when thoroughly wet.

CHIOLITE has been a rather rare mineral until recently. Small tetragonal crystals and granular masses have been noted. It is a fluoride of sodium and aluminum different from cryolite in the percentages of these elements. It is now coming out of the mine in fair quantity, in masses often a foot in diameter (probably much larger). When transparent and showing brilliant cleavage (up to three inches or so), or conchoidal fracture (up to an inch or so), it is easy to identify. When snow-white opaque it is difficult to distinguish from cryolite. Its greater hardness should be a help, but the writer believes that the probability is that cryolite and chiolite are often intergrown. Also the frequent inclusion of milky quartz in both minerals and the close similarity of appearance of all three, make it necessary to be very careful in naming a massive specimen.

CRYOLITHIONITE: Colorless to milky or gray-white; isometric crystals, sparingly in cryolite.

The following minerals occur in the cryolite, named in approximately the order of their abundance:

SIDERITE: In good crystals up to two inches, rarely six inches or more on an edge, often forming large groups. Sometimes in cleavages up to eighteen inches across.

QUARTZ: Usually milky, generally in crystals intergrown with cryolite and chiolite. Difficult to distinguish because of the identical color. When the mineral is wet, cryolite becomes translucent and quartz does not.

GALENA: Usually in irregular grains up to an inch across and showing perfect cleavage.

CHALCOPYRITE: Small masses, occasionally crystals.

PYRITE: Less common than chalcopyrite and usually in smaller grains.

COLUMBITE: In crystals and irregular grains up to half an inch in size.

SPHALERITE: Occurs sparingly, sometimes in small crystals.

IVIGTITE: A variety of muscovite, greenish to yellowish in color, in minute scales scattered often in seams in cryolite. Occurs in solid masses of small scales, in veins up to three inches thick in a mixture of cryolite and barite. Rarely forms small mammillary surfaces.

Various fluorides occur in the deposit, most of which are evidently the result of alteration of cryolite.

PACHNOLITE: Occurs in small sharp-pointed prisms white to brown, often forming lace-like masses with a seemingly cubic arrangement based, of course, on the monoclinic structure of the original cryolite. The writer finds, however, that pachnolite is less common now than it was years ago and that most of the specimens gathered on this trip are some other mineral.

HAGEMANNITE: Brown to dirty yellow, generally looking like earthy limonite. Rarely forms a drusy surface. Sometimes forms pseudomorphs after cryolite crystals. Not recognized as a good mineral species but is quite abundant in small seams. It stains most of the alteration minerals. Some of it may actually be limonite.

THOMSENOLITE: Occurs in transparent to milky crystals or stained brown. It is also found in massive veins, creamy to pink in color, up to an inch in thickness, sometimes so solid as to be called agate like.

GEARKSUTITE: A soft white mineral sometimes resembling kaolin. The best specimens are coatings up to half an inch thick, on barite and ivigtite. They show very definite radiating micaceous scales (crystalline) and a mammillary surface.

RALSTONITE: In small octahedrons, colorless, white to brown, on thomsenolite, quartz and siderite.

Some new minerals have been recently described with which the writer is unacquainted. Among the specimens collected are at least two or three, evidently alteration products, almost certainly fluorides but not yet known to me by name. They occur in small crystals and

drusy surfaces, colorless, white to brown in color.

Associated with both the granitic rock and the cryolite ore.

FLUORITE: Occurs chiefly in small cleavages, purple to white in color.

BARITE: Is found in masses up to a few hundred pounds in weight. It is usually bladed and more or less radiated, gray in color, and often more or less altered. It contains many cavities lined with small crystals (as yet unidentified). Ivigtite and Gearksutite are fairly common with this barite.

Certain minerals occur not in the cryolite deposit but in the adjacent granitic rock.

AMPHIBOLE: Hornblende—in green to black blades.

BIOTITE: Or some other black mica.

CASSITERITE: In bright crystals or massive, sparingly.

EPIDOTE: Green usually granular.

FELDSPAR: Apparently orthoclase, small cleavages and occasional crystals.

FLUORITE: Purple to white, generally in small cleavages, occasionally mixed in the cryolite.

MOLYBDENITE: Not common.

MUSCOVITE: Or other light colored mica, in plates up to three-quarters of an inch.

WOLFRAMITE: Massive and occasionally in crystals.

Now just one thing to discourage you. The Danish Government does not permit people to go to Greenland. Tourists and travelers are not allowed. But I was there! The people at the mine, from the general manager to the ordinary laborer, were most cordial. I believe I left friends in Greenland when I came home. They entertained me royally. I ate and drank with them and I can never forget their hospitality. Even if my memory were poor the minerals I have would always remind me of these fine friendly folks.

A Forest of 350,000,000 Years Ago

A truly primeval forest, with vegetation as scientific research indicates it must have appeared 350,000,000 years ago, is restored in a large mural painting on exhibition in the hall of historical geology at Field Museum of Natural History. The painting, twenty-five feet long, visualizes the diverse flora of the Devonian period during which the earth's gradually expanding plant life first attained the size of trees. The plants and trees are represented in accordance with observations made on fossil specimens. A number of the fossils themselves are also on exhibition at the museum.

The species of plants and trees restored all have been long extinct, and most of them differ radically from any to be found growing on the earth today. Prominently shown are the Gilboa trees, thus named because the first fossil specimens found were discovered in the vicinity of Gilboa, New York. These are believed to be the oldest of all trees. Other species represented include ancient clubmosses, "horsetails" or calamites, and plants which occupied a transitional place in evolution between seaweed and true land plants. The painting is by Charles R. Knight.

GOIN' DOWN THE ROAD

By J. W. PATTON

Los Angeles, Calif.

When it came near time for my vacation, my wife and I discussed a list of places we had not visited. We have formed a habit of breaking the routine once a year by going for a trip to strange places. We have been pretty much all over California and into Arizona, Nevada, Utah and Oregon, usually driving from twelve hundred to two thousand miles per trip. This year I did not favor a long trip; I preferred several short ones, but my wife had heard a lot of stories about the Carlsbad Cavern in New Mexico and wanted to visit it.

Being a mineral collector, I like to go where I can pick up specimens. I knew there would not be much chance of that in a National Park, so I held out for some other trip, but we finally compromised by going to the Cavern, and I must say that although I have seen a great many wonderful places, such as Niagara Falls, Yosemite Park, Boulder Dam, The Redwood Highway, and many others, I never enjoyed any place as I did the "Cavern."

For the past ten years I have been studying geology and mineralogy and have acquired a good collection of specimens and stones. Of one thing I am now sure —every student of geology and every collector should see the Carlsbad Covern to realize how Nature accomplishes things. Here you see tiny stalactites and stalagmites just starting to form, and in every stage from the size of a match to the "Giant Stalagmite" which is sixteen feet in diameter and sixty-two feet high, showing beautiful crystallized forms over its entire surface.

Well, after this digression I will go back to the start and take you along on the trip.

I recently had a new motor put in the 1932 Ford V-8 and did not know how it might act. Well, there was nothing to worry about. It gave us 16½ miles to the gallon and a top mileage of 19½.

We started from Los Angeles at 11:00 A.M., Saturday, October 3rd, 1936, and drove down the coast highway (No. 101), through Long Beach to Oceanside, then turned east to Escondido. Here we climbed over the hill into the beautiful San Pasqual Valley. Just at the bottom of the grade is the cemetery in which are buried some sixty-five sailors and marines who had started from San Diego to assist the American troops in the fight for control of Los Angeles, about 100 years ago. They were ambushed in the San Pasqual Valley by the Mexicans and were buried where they fell. The cemetery is enclosed and there is a monument bearing the names and rank of the men. It is hard to realize that a massacre could have occurred in this quiet, peaceful valley. Anyone passing this way should be sure to see this cemetery.

From here we continued up the San Pasqual grade to the town of Romona. This town is situated on a high mesa on the paved highway which extends from San Diego to Julian and is forty miles from San Diego and fifteen miles from Julian, which is on the summit of the mountains among big pine trees. Both of these towns are picturesque and old. They were on the old Butterfield stagecoach road between Yuma and Los Angeles.

We often go to Ramona to enjoy the hospitality of the old Kenilworth Inn which has not been greatly changed. The host, Mr. Roques, and his good wife are always glad to see us and in addition we are sure of the best chicken dinner in California for which this inn is justly famous. We were now 118 miles from home and decided to remain over night.

Sunday, Oct. 4th

Sunday morning after a good breakfast we traveled up the hill through Julian. Here there is a choice of roads. One by way of Kane Springs and Brawley to El Centro, on Highway No. 80, known as the Yuma road, and the other to the right to join the same highway at

Laguna Junction about fifty miles east of San Diego. We chose the latter as there is beautiful scenery all along the way.

All the roads I have named are paved and in good order except the road between Julian and Kane Springs which is paved but is being repaired. However, it is open.

We proceeded on Highway No. 80 through Yuma to Gila Bend, Arizona. Here again there is a choice of routes. One through Phoenix and Globe to Lordsburg, New Mexico,—and the other through Casa Grande, Tucson, Bisbee and Douglas to Lordsburg.

We chose the latter route as I wished to see Bisbee.

We hunted up an auto court at Casa Grande and spent the night there, having traveled 350 miles that day.

All along the road we had been passing cotton fields. The cotton was being picked and at almost every farm there were signs along the road, "Cotton Pickers Wanted." I might say here that this condition prevailed throughout Arizona, New Mexico, and Texas. To me the cotton crop appeared unusually good.

Monday, Oct. 5th

We drove to Tucson for Breakfast. This is one of the most beautiful towns I have ever seen. Here is located the University of Arizona with its fine buildings and beautiful grounds. The streets are wide and mostly paved. There are good hotels, stores and theaters. Also many fine churches. It is very popular as a health resort.

Continuing from Tucson we passed through Bisbee the famous copper mining town and home of the "Copper Queen" mine. This town is built on both sides of a narrow ravine and is a good duplicate of pictures I have seen of Swiss villages. The main street follows down the center of the ravine for a distance of about two miles, with buildings close together on both sides and a large water-way at one side, crossed by small bridges. This, I think, is the most picturesque town I have seen. The street is continually turning and dropping down hill. There are no straight places and no level ground along it. But it is beautiful just the same.

We arrived at Lordsburg at 4:30 P. M., having traveled 280 miles that day.

Tuesday, Oct. 6th

We left Lordsburg at 6:45 A. M. and drove to El Paso, Texas. Here we did the usual tourist stunt—crossed the river into Old Mexico, bought a few trinkets and mailed some postcards. There is something curious about these towns on the Mexican side of the border. They are full of people who are apparently doing absolutely nothing, then when you cross back to the American side you find the people wide awake and hustling. Oh, well, maybe that is just an old Mexican custom in the "Land of Manana."

Leaving El Paso, we traveled northeast over a hundred miles of fine paved road to the junction of the Van Horne road. Fifty miles of this road out of El Paso is absolutely straight and would be monotonous except that it is lined on both sides with a gorgeous display of wild flowers of every color. The flowers are large as there have been copious rains here. This is open range and you are warned by signs to watch for cattle. We saw many herds of fat cattle. The pasturage here is good.

From the junction of the Van Horne road there is forty-eight miles of dirt road to White's City, which is the auto camp for the Cavern. The dirt road is good and well taken care of. We arrived at White's City at 4:30 P. M., having traveled 323 miles during the day.

We secured our cabin and then went on up to the Cavern, over six miles of wonderful paved road, to see the bats come out of the Cavern. This is one of the daily shows. Just before sunset they come out in swarms totaling thousands, and dart away in their nightly hunt for insects. They return about sunrise and nose-dive into this great hole in the ground.

I had the wrong conception of the entrance to the Cavern. I supposed it would be at the bottom of a hill, as all other caves I had entered were that

way. This one is on top of the hill and is an elliptical opening which looks to be a hundred feet long by fifty feet wide. This hole was known to early New Mexican settlers as The Bat Cave, but was not explored until a cowboy named Jim White happened to ride by there one evening and saw the enormous flight of bats from the entrance. He concluded that there must be a very large cavern there and determined to try to get into it. He returned later and descended to find the most amazing sights he had ever dreamed of.

He made numerous trips in and explored parts of the Cavern. He later rigged up an iron bucket, large enough to hold two people, and conducted tourists through in this way. The entire place was on school lands and could have been bought of $800.00. Jim carried on and acted as guide until the Government took it over and made it a National Monument. Later it was made a National Park, and is now in the care of National Park Rangers.

The Government spent a great amount of money building trails, installing electric lights and erecting buildings. There are the usual buildings for the men to live in, also store and shop buildings and a large power house which furnishes the electric current. There is also a large building which houses the elevators. But more about that later. The buildings are all built of stone and blend with the surrounding landscape. All water and supplies are hauled in.

The Rangers are a fine body of men, very courteous and pleasant; always ready to be of service and answer questions (no matter how foolish).

The bats make their home here during the summer, but about this time of the year (October) some of them begin hibernation and the rest go south, presumably to Mexico, to return in the spring.

At White's City there are fifty good cabins each with a shower-bath and an oil heater. They have good beds which are very comfortable. There is a gas service-station, a store, a museum, and a large cafe. These, with the cabins, constitute White's City. The cabins cost $2.00 per night with bedding. We had a delicious dinner at the cafe which

Cabins along the entire route were from $1.50 to $2.00 and meals no higher than here in Los Angeles. Gasoline averaged 22 cents per gallon.

There is a free lecture each evening in the Museum in which the speaker discusses early history of the region and

Entrance to Carlsbad Cavern, New Mexico
(Note two men, tiny figures, in front of entrance)

shows some mummified people which are said to be of the Basket-weavers Tribe. He also gives statistics as to the number of visitors. This, in summer, is about 750 per day, and since the Cavern was opened a total of over eight hundred thousand.

Wednesday, Oct. 7th

Wednesday morning we went up to the Cavern buildings and bought our tickets, which are a dollar and a half. We were early so my wife checked the automobile licenses as they came in and found there were cars from 25 different states. There were 269 people. One was from Mexico and another from Ireland. This was a small day as it was getting cold and was very windy. On two days in 1935 there were people from every state in the Union and ten foreign countries.

About 10:30 A. M. we formed in line, two abreast, and started walking down the trail into the Cavern with a Ranger in the lead and one bringing up the rear. This trail leads downward a total of 800 feet to the floor of the Cavern. The flood-lights are so placed as to reflect upward. You do not see the lights themselves, consequently there is no blinding effect. Nevertheless, the entire Cavern is well lighted.

Before we started the Ranger warned us that no one is allowed to touch anything, as the Government wishes to keep this place intact for the enjoyment of future generations.

As we passed along there were constantly changing scenes. There are thousands of beautiful stalactites hanging from the ceiling, and just as many stalagmites beneath them. At some places the stalactite and stalagmite have united to form a continuous member from floor to ceiling. These are called "Columns." All of these formations are crystallized. In some places they are yellow, gray, or brown. In others they are pure white. I saw calcite, satin spar, alabaster, every color of travertine, and many others which I could not define in passing along.

One strange thing is that although I am a rabid collector, I had no desire to touch anything here. These things seem almost sacred and would never be as beautiful anywhere else as they are in their natural setting.

Some people have the idea that this place is volcanic. This is wrong. It is just a mountain of limestone with the center hollowed out and the surface water dripping through the limestone has deposited all these beautiful things for us to see. And this is cold water, too.

The temperature in the Cavern remains at 56 degrees at all times. There is a peculiar formation which is called Elephant Ears. They hang from the ceiling in great slabs, as much as three feet wide, but very thin, some of them only one-fourth inch thick, and are translucent. Many of the formations look like enormous heads of cauliflower, others resemble balls of pop-corn. In some places in the walls there are holes through which a stream of soft mud is slowly oozing and crystallizing.

In many places the water is dripping from the stalactites above to the stalagmites below, which show a wet, shiny surface. These are crystallizing also. After three hours we came to a hill, up which we climbed by a winding trail.

At the summit, stone seats had been placed. Here the Ranger called for us to be seated and remain absolutely quiet. Over to the left was a beautiful stalagmite, showing white and all the shades of brown and yellow. It is about ten feet in diameter and forty feet high. It is symmetrical throughout, is beautifully crystallized, and is the most wonderful specimen I have ever seen. They have named it "ROCK OF AGES." The growth has been watched in recent years on these stalagmites, and geologists estimate that sixty million years were required for this one to reach its present size.

After we were seated, the lights were turned out, and then we knew what absolute darkness means. We were then 750 feet below the surface. Any one who has never been in this kind of a place can have no idea of real darkness. It makes you feel utterly helpless.

Shortly after the lights went out we were entranced by some good voices singing.

"Rock of Ages cleft for me."

They were the voices of the Rangers and they were singing very softly but every word was clear and distinct. I have inspected buildings in Los Angeles for fifteen years but I must say that man never created such accoustic qualities as Nature provided here.

The beautiful words and music of the old song, heard in the darkness, seem to awaken memories of long-forgotten things. They seem to be a prayer and a promise of Light to come. Finally the voices dropped almost to a whisper with the words—

"In my hands no price I bring,
Simply to Thy cross I cling."

Then suddenly, far off in another cavern a faint light comes on, soon another appears in the opposite direction, then the others come on just as the singers finish the song—

"Rock of Ages cleft for me,
Let me hide myself in Thee."

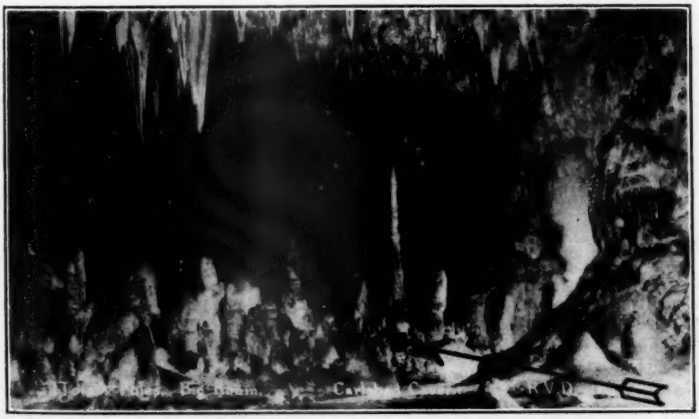
Then you realize you have listened to a beautiful prayer. You also have the feeling that this would be a poor place for an atheist to come unless he wants to become converted.

In the Big Room there is a cafeteria where you take a tray with sandwiches, cake, fruit, and other things, with a cup of coffee. You pass over to a table and enjoy this, after which there is more hiking.

The ceiling of this room is 250 feet above the floor. The Big Room is 600 feet long with a perfect arch supporting the 500 feet of rock above.

At 3:00 P. M. the members of the party who wish to walk back start off by a different route which will bring them to the surface at 4:00 P. M. The balance take the elevator. This is one of the sensations of the trip. These elevators, two in number, each holding eleven people, were installed at a cost of a $120,000. It is 700 feet from the Cavern to the surface at this point. The elevator glides up smoothly and there is very little sensation of movement except the hand on the indicator. In one and a half minutes you are on the surface. Some people are afraid to use the elevators and others have told me they would be afraid to enter the Cavern at all.

From my study of engineering and geology, I consider the Cavern as being perfectly safe. The great stone arch is perfect. The air is very good. Evident-



"Totem Poles" in the Big Room of Carlsbad Cavern. Arrow points to man standing at base of large stalagmite. Note the comparison.

ly there are a number of openings to the outer air. There are pools of clear water here and there which make a perfect reflection of rocks above. There is another great Cavern below this one which has not yet been entirely explored and which is not open to the public, although we could look down into it at a large opening and see ladders used by the men who have been down.

The Government has done a wonderful job of lighting, trail-making and preparing the Cavern for one's enjoyment and any one who is a geologist or a student of geology, or a collector should make every effort to see this great exhibit. They will never see anything like it in a museum.

Leaving the Cavern at 3:30 P. M. we started down the road toward El Paso. We had thought of going north to Roswell and west over the Santa Fe Trail but found out that we would have 200 miles of dirt road. We also heard that there was snow and rain to the north. That decided the question and we went south.

We traveled down to some cabins about sixty miles east of El Paso. They did not look very promising but there was no choice. The place was operated by a young Texan and his wife. There was the usual gas pump, lunch counter and cabins. While his wife was making up a bed for us, the husband undertook to fry us some ham and eggs. Well, between selling gas and oil to other customers and attending to the baby which we could hear in another room, he finally managed to get our ham and eggs ready. This, with coffee and bread, seems to be the standard meal, but who cares when one is on a trip.

We retired to our cabin and hung our coats over the window for a shade and, surprising as it seems, spent a comfortable night except when a coyote howled under the window. It was cold that night but we had a wood stove and didn't mind it.

Thursday, Oct. 8th

Next morning we were out at seven o'clock and went over to the gas pump to fill up. As we were leaving, the Texan looked wistfully up and down the road and said,—

"Well, so long. I guess you all will be goin' down the road." That seemed to me a very appropriate title for this story. I don't blame that Texan for wanting to be "Goin' down the road." That is the lonesomest place I can think of to live in.

We went on about twenty-five miles to a more promising looking place. There we had our choice between ham and eggs or bacon and eggs. Not much choice, but at least we had the privilege of turning down the bacon.

Leaving here we passed through El Paso and Lordsburg; here we took the upper road through Duncan and past the Coolidge Dam, to Globe, Arizona. This made 478 miles since we left the Cavern.

That night as we were about to retire there was a terrific uproar in the court but we paid no attention to it. Next morning we learned there had been a fire alongside the cabin next to ours. Some fellow's trailer had caught fire, and the noise we heard was the fire department. But little things like that don't count when you are "Goin' down the Road."

Friday, Oct. 9th

We left Globe Friday morning and drove to Phoenix. Here there is again a choice of routes. One by way of Yuma and the south. The other by way of Wickenburg and Blythe. We chose the latter route and at Wickenburg debated whether to go on north through Prescott to Mayer for some onyx or to go home. We finally decided to go on home.

We had the car greased at Wickenburg and the oil changed, as 1,700 miles is plenty without a change.

Leaving Wickenburg we crossed into California. This placed us twice in California, Arizona, New Mexico and Texas. Crossing the Imperial Valley from Blythe to Mecca was the only real hot weather we encountered.

At Mecca, instead of continuing north to Riverside, we turned south and drove forty miles to Kane Springs. Here we turned west on the road to Julian. This

was almost an error as we found the road torn up, and under construction for five miles just east of Banner. However, we got through and just after we passed the road-house at Banner about 7:30 P. M., we were surprised to see two beautiful wild-cats jump out in front of us and scamper along in the beam from the head-lights. They were not scared either, and when we came too close they turned and snarled at us. After about a half mile they found a trail that suited them and turned off into the brush.

We reached Ramona at 8:30 P. M., Friday night, having made 452 miles that day. We had left there the preceding Sunday and had traveled 2,000 miles.

Saturday, Oct. 10th

We returned by the coast road as it was too hot to come in by way of Pala, Elsinore, and the Santa Ana Canyon.

When we reached home our speedometer showed 2,151 miles for the week.

"Well, so-long, folks, I reckon we all will be

GOIN' DOWN THE ROAD."

Queens Mineral Society Adopts "Rocks and Minerals"

The newly organized mineral club, Queens Mineral Society of Long Island, has also adopted **Rocks and Minerals** as its official journal. This affiliates the club with the Rocks and Minerals Association and a Certificate of Membership has been issued to the new organization. The Certificate will be framed and displayed in the club room.

Sunday, Oct. 31st, the club chartered a large bus and made a trip to the feldspar quarries at Bedford, N. Y., where a number of interesting minerals were collected. The day was ideal for collecting.

Beginning Wed. Nov. 3rd and lasting through Wed., Nov. 17th. the Society sponsored its first exhibit of minerals at the Jamaica Public Library, Jamaica, L.I., N. Y. Some of the outstanding minerals were chalcedony from Florida by Mr. E. Maynard; North Carolina minerals by Mr. M. McKown, and agates and amethysts by Mr. P. Thein.

The club meets once a month at the Richmond Hill Public Library, Richmond Hill, L. I., N. Y. Membership is opened to all collectors residing in this area. For further particulars apply to Miss Bernadette Reis, Sec., 10314 97th Ave., Ozone Park, L. I., N. Y.

FRACTURE AGATE

By THOMAS A. REINER

In the September-October 1936 issue of **Rocks and Minerals,** there was devoted to agate a special chapter in which all of the different agates were discussed or described. Strange to say there was missing one agate—the rarest and one of the most beautiful in the world. Why this was omitted from the agate number of **Rocks and Minerals** is clear, when perhaps the number of collectors that have ever seen a fractured agate can be counted on the fingers of the hand. In 1931, I was a visitor in New York City and a guest of George O. Wild, now in Idar, Germany. Before leaving New York, Mr. Wild gave me a piece of agate which he explained was Fracture Agate and it was a piece off one of two, the only two pieces in existence, one in the hands of Tiffany's in New York, and the other with the National Museum in Washington, D.C. This piece of agate I have carried around with me for years, sunk in a plaque and never gave it another thought. Now if there is anybody that should know his agates it is Mr. Wild, and as to the naming of the rare variety and the authority for its rareness, all credit goes to Mr. George O. Wild of Germany.

In Montana we have agates covering a wide variety. Everything that can be found in any other state can be found in Montana usually in large quantities and of a superior grade. I was tipped off by a friend regarding certain small balls that were very hard and which contained bands and crystals and—could I tell him what they were? I visited the locality several times and found that the balls were nodules of opal, agate, chalcedony and calcite running in size from a pea to that of a hen's egg. A number of these I collected but was not satisfied with them and so continued the hunt looking for the matrix and large nodules in hopes of finding fire opal. Larger nodules I did find, some that weighed as much as 10 pounds. Most all of the larger ones were calcite, but I did get home with some that had the most unusual and irregular markings that I have ever seen. One or two of these I cut and polished, gave them both the acid and hardness test and on comparing with the sample given to me by Mr. Wild, I found that I had the rarest of all agates, the fracture agate. The agate occurs in nodules which are found in decomposed rhyolite. Some of the matrix material was found with nodules of different sizes and containing opal, chalcedony, etc. The fracture agate has a base of cream to white, translucent chalcedony and the rhyolite, in every conceivable pattern, is plastered in the matrix in no certain pattern. The same pattern could be made by taking a pair of scissors and cutting paper in an aimless way throwing the cuttings on the floor and leaving them lay as they fell. While very little of this agate has been cut, it appears that there is going to be about three colors and the designs are different in every piece cut. If what Mr. Wild said about the rareness of this agate is true, it is doubtful if there are any collectors in the United States in possession of this agate outside of those that have received it from me. There is no comparison with any other that I have ever seen or heard except that certain breccias might in a way, have the basic principle but not the forms. No collection is complete without this agate and the collectors will be allowed to purchase this at a reasonable price. Maybe there are other places that this can be secured under a different name but the credit for naming the agate goes to Mr. Wild and as said before, if anybody knows agate, it is Mr. Wild.

Make this a mineralogical Christmas. Give minerals to your friends.

NOTES ON A NEW GOLD MINE AND FLOTATION MILL NEAR WASHINGTON, D.C.

BY DR. TITUS ULKE

Located about 10 miles from the city of Washington, on Bull Neck Run, in Fairfax County, Va., the gold mine of the Virginia Mines, Inc., is now, (Nov. 1937), said to be producing about 10 to 15 tons of ore daily, which is concentrated and the product shipped to the smelting works at Carteret, N. J. The ore, reported obtained rom near the surface, showed some rich streaks of free gold but that now mined (about 100 feet down) is an auriferous pyrite accompanied by some galena and chalcopyrite and occasionally a little bornite in a schistose gangue of jumbled quartz, chlorite, sericite, feldspar and talc. It is said to average from $6 to $10 per ton in gold, with a trace of silver.

The vein appears to be normally about 6 feet wide, dipping steeply to the northeast, and the country rock is an altered gneiss. From the gallows-frame covered, two-compartment, timbered shaft, drifts are being driven along the strike of the vein on the 100 foot level.

The ore is hoisted by oil-engine power in steel barrels to the surface and dumped through grizzlies into ore cars to be taken by cable up an incline to the mill located on the hillside above the shaft house. At the top of the concentrating (oil flotation) mill, the ore is dumped into a Blake jaw crusher, set to 1 inch, and fed by gravity down into a 3 x 3 feet ball mill in which 3-inch iron balls serve to comminute the crushed ore. At its discharge end the ground material is continuously fed into an inclined spiral classifier of the Atkins type, the classified fines being discharged into two vertical jigs, each provided with a coarse mesh screen and a layer of small shot to form an artificial separator, while the coarser particles from the classifier are returned to the ball mill for further reduction.

The jig concentrates, which are nearly pure iron pyrite, are taken out, dried, sacked and shipped. They are said to run as high as 6 to 10 ozs. of gold per ton, representing a ratio of concentration of 35 to 1 of ore. The jig tailings are poured into a battery of three flotation cells, together with an emulsifying dope of pine oil, copper sulphate and xanthate.

In the second and third flotation cells, a partial or rough concentration is effected, the tailings being fed to the first cell, which produces a finished concentration product, running, it is said, about 2½ ozs. of gold per ton, together with waste tailings, which are discharged into a tailings pond. The finished flotation concentrates are run into cloth-lined wooden filtration or settling tanks, in which most of the accompanying liquid is drained off, leaving wet concentrates, which are then dried, sacked, and shipped to Carteret.

To provide for the amalgamation of any free milling ore, should it be encountered, two standard make silver plates are provided, as well as a Wilfley table, but these auxiliary devices are not now being used.

The above outlined mill, while of small capacity, appears to be a model plant for treating low grade pyritic gold ore. In conclusion, I may add that our government aided in its construction by a grant of $20,000.

A book on minerals makes nice Christmas present.

NEW EMERY STRIKE IN PEEKSKILL

By FETER ZODAC

Editor, Rocks and Minerals

The emery deposits at Peekskill, N. Y., are noted the country over as America's chief source for the mineral. The deposits occur in the norites of the Cortlandt series of rocks which bound Peekskill on the east and south.

Five areas for emery are present around Peekskill. The first and most important is at Toddville, 2 miles east of the city, where the most extensive operations have been conducted. The second is near Furnace Dock Road north of Maple Ave., 2½ miles southeast of the city. The third is on Keg Mountain, 3 miles southeast of the city. The fourth is around Colabaugh Pond, 4½ miles southeast of the city. The fifth and last is around Crugers-Montrose, 3 miles south of the city.

The emery is found in small veins, pockets and sometimes in well developed lenses. Many types occur as pure emery, spinel emery, feldspathic emery, emery schist but locally they are divided into three groups, black, gray and pink emery. Pure emery is a mixture of magnetite and corundum—the gray is considered the best and the pink poorest. It is used as an abrasive but during recent years it has been superseded by artificial products. The best emery comes from Greece and Turkey; Peekskill emery is considered too soft in comparison.

The operations around Peekskill are all small workings—for the past few years only 3 or 4 men being the total number engaged. During the World War, when imports from Europe were cut off and Peekskill was called upon to fill the emery demand, about 100 men were employed in the mines, as the small pits are called.

Due to the small number of men employed, emery is extracted in a very crude and primitive manner. Small pits or cuts are made in the exposed rocks containing emery (the ore outcrops on the surface), and because the pockets or veins are easily exhausted no extensive equipment is necessary—a few crowbars, sledgehammers, wedges and a wheelbarrow constituting the chief tools needed. Though emery is so tough that drilling is out of the question, it nevertheless is so thoroughly jointed that it can easily be wedged out. Now and then a little blasting (dynamite inserted in holes dug in the dirt vein surrounding the emery) helps to break up the ore.

For the past 10 years or more, all operations have been conducted in the Toddville area, especially on the Strang estate. Lately the area has been subdivided into building lots and many houses built, often over abandoned emery pits which form their cellars, so that the Strang estate may now be considered as the chief source for emery.

The emery, as has been said, occurs chiefly in small pockets and veins which are soon worked out. Even though a small tonnage is extracted yearly, the amount of available emery in sight is diminishing fairly rapidly; in fact it was thought last year that the Strang locality would be exhausted before the year was out.

Mr. Gaetano DiRubbo has been mining emery in this area for the past 20 years. He is a good friend of the writer and we have traversed all the emery localities thoroughly (with the exception of those on Keg Mountain which are difficult to reach) accompanied by Mr. Joe DeLuca who has a lease on an emery mine in the Colabaugh Pond area. Time and again has the writer (an old mining engineer) advised Mr. DiRubbo that instead of abandoning a pit after its emery has been extracted that he should dig deeper with the possibility of striking another vein or pocket. This of course would mean that the rock in the floor

of the pit would have to be drilled and blasted out. But Mr. DiRubbo thought little of the suggestion—once a vein or pocket was exhausted there was no more emery underneath. This had been the general belief among all emery miners in the past—no one ever thought it necessary to do any investigating. In this, they should not be censored as the former miners were mainly amateurs—many did not even know what emery looked like. During the World War when emery was in much demand, these amateur miners dug pits, here, there, and everywhere—and anything that was black and heavy to them was emery. Foremen, with samples of 'emery' in their hands, would rush from one operation to another to determine if what they were mining was really emery. Furthermore, drilling through rock, even though it was much softer than emery, was a slow and expensive operation. Then again, why drill and sink deep pits when lots of available material was then exposed on the surface and could be easily and cheaply obtained? Furthermore, who cared about what was underneath a pit!

Since the World War, emery mining around Peekskill has almost ceased as artificial abrasives have practically ruined the emery industry. And what emery is needed can easily be secured from abroad even though at a higher price. Nevertheless, emery mining in Peekskill is still in existence and its new strike may improve it immensely.

On June 13, 1937, Mr. DiRubbo stumbled upon a loose mass of gray emery embedded in glacial drift near a small tunnel on the Strang estate. This surprised him a lot as it was the first occurrence of loose material being thus found—he had not heard of it either. The emery was of good quality and out of curiosity he dug into the drift and more and more loose emery was extracted, so much in fact that before the pit was abandoned he had almost a carload (45 tons) of good ore on hand. Whence did this come? He could not tell but believed it might have come down from a vein higher up on the hill.

The very day that he abandoned the pit in glacial drift, as the emery was exhausted and they had reached rock, he happened to notice in the rock a thin vein of dark brown dirt. Experience has shown him that such thin veins of dirt were worth investigating. So taking a pick he dug down into this vein for about a foot, removing at the same time some of the rock which happened to be much jointed, when to his amazement emery was exposed. The pit was not abandoned but dug deeper and the rock which overlaid the emery easily removed due to the jointing. The amazing feature of the emery, to Mr. DiRubbo, was that it was beneath the vein in the tunnel above—about 6 feet of rock, vertically, separating the two veins. The writer's theory was thus verified—that the bottom of a surface vein or pocket of emery is not the end of the mineral, that more can be found on digging deeper. Of course Mr. DiRubbo lost no time in telling the writer of his discovery and insisted that he come out to examine the new strike. But it was almost two weeks before the writer could visit the locality, on Nov. 8th.

The vein had been excavated to form a pit 15 feet in diameter and 20 feet deep—the emery being wheeled out through a tunnel, 3x6 feet and 30 feet long, driven entirely through a compact glacial drift. But the emery—it was the finest the writer has yet seen from Peekskill—was lustrous, gray and clean. The average emery from the surface workings is often stained, streaked or so dark that at times it is difficult to ascertain from a look at the mining face which is emery and which is rock. Even stock piles of emery contained drab, unattractive material but this new stuff was different. The small stock pile near the tunnel entrance was so conspicuous that it was easily spotted 300 feet away (the area is heavily wooded and in a wild section) while at the pit face it stood out distinctly—there was no question as to which was the emery and which was the rock. None of the material has been shipped

to the emery mills as yet so that its actual test is still to be determined. Because of its fine appearance, the chances are good that its quality may be vastly superior to the surface material and that it may even compare favorably with imported emery, which, if this proves to be the case, may create a wide demand for Peekskill emery.

Unfortunately the pit has not progressed far enough to fully expose the new vein and to make matters worse all mining operations ceased the very day of the writer's visit. Operations will be resumed in the spring of 1938. The vein showing in the pit has been excavated only to a depth of 8 feet (bottom of pit is 20 feet below surface) and has shown no signs of pinching out. Mr. DiRubbo believes its extension is north and south because so far it lies horizontally in these directions for a distance of 12 feet. His observations on surface material were that the length of a vein was generally in a horizontal plane. If this be true, then the two veins—in tunnel and pit—are not parallel but almost at right angles to each other. Nevertheless, the new vein will be carefully observed in future operations and we hope in time to ascertain its true volume and extent.

Before this issue of **Rocks and Minerals** is released, the newly mined emery will be shipped to the Hamilton Emery Mills at Chester, Mass., and a report on its qualifications will be eagerly awaited. Whether the report is favorable or not, the fact remains that emery can be found deeper in a pit whose surface vein or pocket has been exhausted.

A rather satisfactory and conclusive survey of what deposits of emery lie below the surface on the Strang estate could be determined by a series of diamond drill holes and their cores studied. In this way it might be possible to locate and plot the general course of emery veins that may lie still deeper than those that have been exposed. This would also indicate the location of tunnels and shafts to reach the underlying veins.

RECENT FINDS OF INTEREST

Mr. C. D. Blackman of Pleasant Hill, Mo., sent to **Rocks and Minerals** two specimens which he recently picked up along a railroad track near his city. The specimens are mainly black diabasic rocks in which are embedded tiny masses and veinlets of pyrite, chalcedony and agate; one specimen contains a little vug whose walls are studded with tiny rock crystals. But encrusting both specimens are thin sheets of anthracite coal. This combination of anthracite with quartz minerals is the first to come to our attention. It is too bad that the locality itself cannot be located by Mr. Blackman as the specimens are of more than passing interest.

A very fine specimen of cyrtolite was picked up at the Kinkel feldspar quarry, Bedford, N. Y., Oct. 31st, by Mr. Curt G. Segeler of Brooklyn, N. Y.

Long Island in New York is not known for minerals, but Mr. Harry Grahl of New York City recently found some excellent specimens of crystallized marcasite. The specimens were found at Glen Cove.

Fluorescent Minerals

Autunite: Some very fine specimens that fluoresce a deep green under the cold quartz lamp have been found recently in the feldspar quarries of Grafton, N. H.

Aragonite: At the prison limestone quarry near Staunton, Va., some good, compact-fibrous, colorless masses of aragonite that phosphoresce bluish-white under the cold quartz lamp have been found by Mr. Robert O. Wilbur of Waynesboro, Va.

Calcite: At the above prison quarry, Mr. Wilbur also found some very nicely banded limestone encrusted by calcite. The three colors of the limestone—buff, gray and dull red plus the white of the calcite—make most attractive specimens —the finest limestone we have yet seen. Added to this, the calcite phosphoresces bluish under the cold quartz lamp—the best reaction for any calcite seen in the east.

Fluorite: Specimens of brown fluorite from Castalia, Erie Co., and Genoa, Ottawa Co., both in Ohio, found some time ago, were recently tested under the cold quartz lamp. They all phosphoresced bluish-white.

Hyalite: Colorless crusts on granite from Stone Mountain, Ga., fluoresce a deep green under the cold quartz lamp.

Scheelite: Some nice specimens of massive, greasy, smoky gray scheelite in hornblende gneiss, were recently found at the old abandoned tungsten mine on Long Hill, Trumbull, Conn., by Mr. Paul Blatz of Bridgeport, Conn. Under the cold quartz lamp the scheelite fluoresces a lovely blue.

THE AMATEUR LAPIDARY

Conducted by ARTHUR KNAPP
1401 Arch St., Philadephia, Pa.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

MISCELLANEOUS NOTES

Every amateur should include a tin lap in his equipment for the final polish of cabochons. A great many gem materials will be found to be composed of mixtures of crystals of varying degrees of hardness and it is impossible to get a uniformly curved surface with a felt lap, because the softer materials will undercut.

It is not difficult to make a tin lap. One pound of tin will make one, although it is better to have two pounds in order to have enough to pour a good clean casting. Tin melts easily. It may be melted on a gas range in a frying pan. If the bottom of the frying pan is flat, let the tin cool in the pan and you have your casting. A better way is to make a mould of plaster of Paris. Let the plaster mould dry thoroughly and heat the tin quite hot before pouring.

The lap should not be over one-quarter inch thick and a finished lap six inches in diameter is large enough. It may be turned on a polishing head, using an ordinary wood chisel, with a cast iron lap for a face plate. If you have nothing suitable for a face plate, turn out a disc of wood. Use a slow speed while turning the lap.

The completed lap should not be smooth nor polished. Either scratch it with coarse sand paper or make cuts all over it with a razor blade.

Usually the tin lap is used only for the last operation of polishing. The touch should be very light, with a rapid change of position in order not to produce flats. Tin oxide is the usual polishing medium, although any polishing medium may be used. The surface will not contaminate and any material may be washed off readily. A six inch lap should turn about 1750 r.p.m.

A friend of the writer recently added an improvement to his mud saw, which was one of those obvious things that should have been thought of before. The writer's standard mud saw and also the friend's saw, are built so that the gem material rests on the top of the saw. The new departure is a perforated plate with a slot just wide enough for the saw blade. This plate is set horizontally about two and one-half inches below the top of the ten inch saw. (The capacity of the saw is about 2½"). This plate catches any pieces of the gem material which break loose and which would otherwise drop to the bottom of the case and be difficult to remove or if the piece which is being sawed comes loose, the plate catches it and neither the saw nor the case are damaged.

The writer recently built a mud saw with a maximum capacity of over six inches. The saw blade and bearings were on a movable arm about 24 inches long which hung down from an overhead drive. The material to be sawed was placed vertically, opposite the center of the saw. This type of saw, which is comparable to the swinging cut-off saws used in wood working establishments, worked very well. Several quartz crystals five inches in diameter were cut in it. The greatest difficulty encountered was not in the working of the saw but in preventing the mud and abrasive from flying.

Every amateur lapidary should undertake a few spheres. Not only are they very attractive but they are very easy to

make. A recent article by John Vlismas, gives the high lights of the process. Any amateur with home-made equipment can cut spheres up to 2½ or 3 inches in diameter.

Perhaps material softer than quartz should be selected for the first attempts, although a quartz sphere 1½ inches in diameter is not difficult to handle. The writer usually saws the material until it is nearly a cube and then grinds this cube into a cylinder. This cylinder is then turned through 90° and a second cylinder ground. The corners are then ground off and it will be found that a sphere can be ground by hand which is within a few hundredths of an inch of round.

Grinding is done on the end of a tube, with a hole which is about 2/3 the diameter of the sphere. Two tubes should be provided, one to be mounted on the end of the shaft of the polishing head and one to be held in the hand. The writer finds that a horizontal spindle is more convenient than a vertical one.

Brass seems to make the best cutting tools, although the writer has used wood, iron and bambco. Two halves of a brass pipe union are particularly convenient. The worker will have to use his ingenuity in attaching the cylinder to the polishing head shaft. For material as soft as onyx, wood is better than metal.

Use a slow speed and look out for overheating. Since the two tools are presumably identical, the sphere will revolve first in one tool and then in the other, the friction being approximately the same. By holding the hand tool at an angle with respect to the drive shaft, a perfect sphere will be cut.

The coarse grained abrasives will cut very fast. The writer's experience has been that only the grained abrasives may be used on the metal tube. The polishing must be done on wood or leather. Almost any piece of leather will do. Place a piece over the end of each tool and tie in place. Start with a fine abrasive. The leather will have to be changed for each kind of polishing powder. At this stage, overheating is very easy. If the sphere gets so hot that it cannot be held in the hand, don't put it in water to cool, as it is more than likely to crack. The final polish will be slow because heat generates so quickly.

In general, either transparent or translucent spheres are the most interesting, although such contrasting materials as agate look well. Massive yellow opal makes interesting spheres, as do some of the banded and variegated onyx.

Speaking of banded material, the writer was recently given some highly colored pieces of Mexican onyx. When cut into slabs about 5/100 inch thick, they were beautiful in transmitted light. It is possible to cut this material about ⅛ inch thick with a hack saw but it is quite fragile. The best way is to mount it on glass for handling and the most beautiful effect can be had by mounting the slabs with a border of chaser cement. The cement will cut down with the onyx and the border gives a very interesting contrast.

—Arthur Knapp.

This issue is chuck full of desirable items for Christmas gifts. Read all the ads through carefully and select those items which especially intrigue you. Your friends will be pleased when they receive these gifts.

GENERAL INDEX OF AUTHORS AND CONTENTS

VOLUME 12—1937

Leading articles are in bold face type.